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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,817	10/14/2003	Akira Iriguchi	501558.20004	5270

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EXAMINER

MRUK, GEOFFREY S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 03/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/685,817

Applicant(s)

IRIGUCHI, AKIRA

Examiner

Geoffrey Mruk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 14 October 2003.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 5, 6, and 9 rejected under 35 U.S.C. 102(b) as being anticipated by Fukuchi et al. (US 4,549,191).

With respect to claim 1, Fukuchi discloses an ink-jet printing head (Column 2, lines 18-42) comprising

- a flow-passage unit (Figure 2, elements 13, 13-1, 13-2) and an actuator unit (Figure 2, elements 17, 18) laminated on each other,
- said flow-passage unit having nozzles (Figure 2, element 10) and pressure chambers (Figure 2, element 11) communicating with said nozzles, respectively, and
- said actuator unit being operable to apply pressure to ink in each pressure chamber, and wherein each of said pressure chambers communicates at one of opposite longitudinal ends thereof with a corresponding one of said nozzles (Column 3, lines 3-12), and
- at the other of said opposite longitudinal ends with an ink supply source (Figure 1, element 20), and is formed so as to be open in one of opposite

surfaces of said flow-passage unit, such that said each pressure chamber is partially defined by said actuator unit,

- wherein each of said pressure chambers has a depth (Figure 2, element l_1) of $35\mu\text{m}$ - $45\mu\text{m}$ in a direction perpendicular to said one of opposite surfaces of said flow-passage unit (Column 4, lines 41-67; Column 5, lines 1-4).

With respect to claim 4, Fukuchi discloses a depth of said each pressure chamber is selected within a range of $37\mu\text{m}$ - $43\mu\text{m}$ (Column 4, lines 41-67).

With respect to claim 5, Fukuchi discloses a depth of said each pressure chamber is selected within a range of $38\mu\text{m}$ - $42\mu\text{m}$ (Column 4, lines 41-67).

With respect to claim 6, Fukuchi discloses a depth of said each pressure chamber is selected within a range of $39\mu\text{m}$ - $41\mu\text{m}$ (Column 4, lines 41-67).

With respect to claim 9, Fukuchi discloses a depth of said each pressure chamber is about $40\mu\text{m}$ (Column 4, lines 41-67).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 3, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuchi et al. (US 4,549,191) in view of Usui (US 5,956,059).

With respect to claim 2, Fukuchi discloses a flow passage unit (Figure 2, elements 13, 13-1, 13-2) includes a first plate (Figure 2, element 17) through which said pressure chambers (Figure 2, element 11) are formed, a second plate (Figure 2, element 12) formed with said ink supply source, and a third plate (Figure 2, element 2) where the first plate is fixed to said actuator unit (Figure 2, elements 17, 18) and said second plate being sandwiched by said first and third plates.

Fukuchi does not disclose a third plate formed with nozzles.

Usui discloses a third plate (Figure 1, element 27) formed with nozzles (Figure 1, element 28).

At the time of the invention it would have been obvious to one of ordinary skill in the art to use the structure of Usui in the print head of Fukuchi. The motivation for doing so would have been to provide an inkjet print head that is high in mechanical strength (Column 2, lines 44-55).

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With respect to claim 3, Fukuchi discloses a plurality of piezoelectric sheets and active portions that are defined over respective pressure chambers (Column 2, lines 18-30; Column 3, lines 3-12).

Fukuchi does not expressly disclose a plurality of individual electrodes and a common electrode.

Usui discloses individual electrodes (Figure 1, element 5) and a common electrode (Figure 1, element 34).

At the time of the invention it would have been obvious to one of ordinary skill in the art to use the actuator unit of Usui in the print head of Fukuchi. The motivation for doing so would have been to provide an inkjet print head where the positional accuracies of the print head members are maintained irrespective of their different rates of contraction (Column 2, lines 44-55).

With respect to claims 7 and 8, Fukuchi discloses the inkjet printing head.

Fukuchi does not expressly disclose the width of the pressure chamber is from 150 μ m to 300 μ m and the length of the pressure chamber is from 1mm to 4mm.

Usui discloses the pressure generating chambers (element 4) are 190 μ m - 210 μ m in width and 2mm in length (Column 3, lines 38-41).

At the time of the invention it would have been obvious to one of ordinary skill in the art to use the dimensions disclosed by Usui in the inkjet print head of Fukuchi. The motivation for doing so would have been to arrange the nozzle openings to a pitch of 90dpi (Column 3, lines 38-41).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuchi et al. (US 4,549,191) in view of Morikoshi et al. (US 6,382,754 B1).

With respect to claim 10, Fukuchi discloses a pressure chamber (Figure 2, element 11) within an inkjet print head.

Fukuchi does not expressly disclose a pressure chamber that has a width of about 250 μ m, a length of about 1.8 mm, and an ink-jet printing head being capable of ejecting droplets of the ink from the nozzles at a velocity of about 9 m/sec when the actuator unit is driven at a maximum drive frequency of about 24 kHz with a driving voltage of about 20.5 V.

Morikoshi discloses pressure chambers (Figure 1, element 3) that are about 250 μ m in width (Column 7, line 5), about 1.8mm in length (Column 7, line 5), and the inkjet print head being capable of ejecting droplets of the ink from the nozzles at a velocity of about 9 m/sec (Figure 11) when the actuator unit is driven at a maximum drive frequency of about 24 kHz (Column 10, lines 66-67; Column 11, lines 1-3).

At the time of the invention it would have been obvious to one of ordinary skill in the art to use the pressure generating chamber's width and length dimensions disclosed by Morikoshi in the inkjet print head of Fukuchi. The motivation for doing so would have been to provide an inkjet printing device that is driven at high speed while being free from generating ink mist (Column 3, lines 9-25).

It would have been obvious to one having ordinary skill in the art, at the time of invention was made, to incorporate a drive voltage of 20.5 V when the actuator unit is driven at a maximum frequency of 24 kHz, since it has been held that it is not inventive

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to discovering and optimum value or workable ranges by routine experimentation. In re Aller, 105 USPQ 233 (CCPA1955).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Raman et al. (US 4,730,197) discloses preferred parameters of an inkjet print head in Table 4.

Usui et al. (US 5,748,214) discloses an inkjet recording head that can reliably eliminate air bubbles within the flow paths, simplify the manufacturing process, and improve yield.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM
3/9/2005



MANISH S. SHAH
PRIMARY EXAMINER